



West Virginia University **OFFICE OF UNDERGRADUATE RESEARCH**

2019 Annual Report



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2019 OFFICE OF UNDERGRADUATE RESEARCH ADMINISTRATION

Dr. Michelle Richards-Babb
Dr. Kimberly Quedado*
Kevin J. Walden
Paige Zalman

Director, UGR and Professor, Chemistry
 Asst. Director, UGR and Research Apprenticeship Program
 Program Coordinator, UGR
 Program Specialist, Research Apprenticeship Program

*In July 2019, Dr. Quedado became the Director of Research and Scholarship, Emergency Medicine, School of Medicine. Though we miss her dedication and enthusiasm, we wish her all the best in her new position.

2019 OFFICE OF UNDERGRADUATE RESEARCH ADVISORY COUNCIL

Dr. Candice Brown	Assistant Professor, Neuroscience and Emergency Medicine
Dr. Nancy Caronia	Teaching Assistant Professor, English
Dr. Ryan Claycomb*	Acting Dean, Honors College & Professor, English
Dr. Damien Clement*	Acting Dean, Honors College & Assoc. Prof, Sport & Exercise Psych.
Dr. Radhica Ganapathy	Assistant Professor, Theatre History & Criticism
Dr. Kimberly Meigh	Assistant Professor, Communication Sciences and Disorders
Dr. Melissa Olfert	Associate Professor, Human Nutrition and Foods
Dr. Geah Pressgrove	Assistant Professor, Media
Dr. Dimitra Pyrialakou	Assistant Professor, Civil & Environmental Engineering
Dr. Aaron Robart	Assistant Professor, Biochemistry
Dr. Christopher Rota	Assistant Professor, Wildlife & Fisheries
Dr. Ed Sabolsky	Associate Professor, Mechanical and Aerospace Engineering
Dr. Christopher Scheitle	Assistant Professor, Sociology

*In July 2019, Dr. Claycomb moved to Colorado State University and was replaced by Damien Clement as Acting Dean of the Honors College.

2019 WVU UNDERGRADUATE RESEARCH PROGRAMS

- **Chemistry Research Experiences for Undergraduates (REU)**, C. Eugene Bennett Department of Chemistry (Directors: Brian Popp & Michelle Richards-Babb; Funding: NSF)
- **Undergraduate Robotics Research in Human-Swarm Interaction (REU)**, Mechanical and Aerospace Engineering (Director: Yu Gu & Jason Gross; Funding: NSF)
- **Summer Undergraduate Research Experience (SURE)**, Office of Undergraduate Research & Honors College (Director: Michelle Richards-Babb; Funding: WVU & WV HEPC)
- **KY-WV Louis Stokes Alliance for Minority Participation (LSAMP)** (Director: David Miller; Funding: NSF)
- **Immunology and Medical Microbiology Research Internships** (Director: John Barnett; Funding: Dept. of Microbiology, Immunology, and Cell Biology)
- **Research Apprenticeship Program (RAP)**, Office of Undergraduate Research & Honors College (Director: Kimberly Quedado & Paige Zalman; Funding: WVU & FWS)
- **Community Engagement in Science Through Art (CESTA)**, C. Eugene Bennett Department of Chemistry (Director: Jessica Hoover; Funding: NSF)
- **Summer Undergraduate Cancer Research Fellowship Program**, WVU Cancer Institute (WVUCI) (Director: Alexey Ivanov; Funding: Fellowship & Research Endowment Funds)
- **NASA West Virginia Space Grant Consortium (WVSGC) Undergraduate Research Fellowship Program** (Program Coordinator: Candy Cordwell)
- **Summer Undergraduate Psychology Research Experience, Psychology** (Director: Natalie Shook; Funding: American Psychological Assoc.)

*These programs are administered and funded by the internal academic units and/or external units. This list may not be exhaustive of undergraduate research programs at WVU.

2019 HIGHLIGHTS, BY THE NUMBERS

- 2** Students representing WVU at the 2019 Posters on the Hill in Washington, D.C.
- 4** Faculty awardees for Distinction in Mentoring Undergraduates in Research Presentations on undergraduate research, RAP and UGR at national or regional conferences (e.g., CUR, Gordon Conference on Chemical Education, First2 STEM Success Network Conference)
- 5** Students representing WVU at the National Conference on Undergraduate Research (NCUR)
- 8** Rising freshmen who engaged in WVU's NSF INCLUDES First2 Network-funded Summer Research Immersion for 2-weeks
- 9** Ambassadors for the Office of Undergraduate Research
- 10** Faculty included as mentors on the 2020 Beckman Scholars Program proposal
- 14** Judges at the 11th annual Summer Undergraduate Research Symposium
- 19** WVU students participating in the 16th annual Undergraduate Research Day at the Capitol (URDC)
- 34** Undergraduates engaging in research and creative endeavors via SURE in 2019
- 65** Past SURE participants listed as co-authors on peer-reviewed publications.
- 94** Students presenting at WVU's 11th Summer Undergraduate Research Symposium (87 from WVU and 30 visiting students)
- 117** Students engaging in research and creative endeavors in the Research Apprenticeship Program in Fall 2019
- 178** Undergraduates presenting at WVU's 3rd annual Undergraduate Spring Symposium (184 posters and 6 oral)
- 190** Students involved in scholarly activity via research coursework during the 2018-2019 academic year
- 880** Minimum number of students involved in research coursework over the last five years
- 3202**

The Office of Undergraduate Research was established in August of 2015. The Office reports to the Dean of the Honors College. WVU is an Institutional Member of the Council on Undergraduate Research (cur.org).

FACULTY AWARD FOR DISTINCTION IN MENTORING UNDERGRADUATES IN RESEARCH

The purpose of this award is to recognize, reward, and encourage faculty members who mentor undergraduates in research and creative endeavors. Nominations are accepted from any source in March of each year. Outstanding nominees are invited to submit supporting documentation. Awards are made at WVU's Annual Faculty and Staff Recognition Ceremony in April.

Sadie Bergeron, Assistant Professor of Biology

Over the past three years, Sadie Bergeron has mentored 24 undergraduate students in her research lab, from which her students have gone on to earn NASA WV Space Grants and Fulbright Scholarships in addition to other honors and funding. Her students have won six best poster presentation awards at internal and external scientific meetings and conferences, and many have served as co-authors on peer-reviewed research publications.

Geah Pressgrove, Assistant Professor of Advertising and Public Relations

Geah Pressgrove has served as coordinator of a formalized Undergraduate Research Academy to support the Reed College's Public Interest Communication Research Lab. After receiving two separate research-based grants from the West Virginia Department of Education, she also trained undergraduate students to be her research assistants, allowing them to actively participate in research that led to a published research manuscript and specific recommendations for the WVDE.

Cheryl McNeil, Professor of Psychology

With her team of graduate and undergraduate trainees, Cheryl McNeil conducts some of the most highly regarded community-based psychology research at WVU. Over the past five years alone, she has mentored six McNair Scholars into PhD programs, and has supervised theses for 10 honors students, all of whom have been accepted to or enrolled in graduate study. McNeil also presents eight to 10 papers at professional conferences with her undergraduate students each year.

Cerasela Zoica Dinu, Associate Professor and Associate Chair of Chemical and Biomedical Engineering

Since joining the WVU faculty in 2009, Cerasela Zoica Dinu has supervised more than 50 undergraduates in a wide range of disciplines; 25 of her mentees have been female students in chemistry, molecular biology, or material science. Many of her students have won national and international recognition, including five best poster presentations from the American Institute of Chemical Engineers and funding from the National Science Foundation and the National Institutes of Health.



2019 Awardees include (from left to right): Dr. Sadie Bergeron, Dr. Geah Pressgrove, Dr. Cheryl McNeil, and Dr. Cerasela Zoica Dinu.

UNDERGRADUATE RESEARCH DAY AT THE CAPITOL

Annually, WVU undergraduates showcase their research and creative works to West Virginia lawmakers and the general public at the statewide Undergraduate Research Day at the Capitol (URDC) event. This event gives lawmakers a glimpse of the value of continuing to fund West Virginia academic institutions in both educational and research endeavors. A total of 77 WVU students submitted abstracts to the 16th annual URDC event. Of those, 34 students were invited and presented their research projects to lawmakers in poster form at the Capitol Rotunda in Charleston, WV on February 26, 2019. The projects were original scholarly works and the presenters designed posters for a general audience showcasing research in fields ranging from communications, biology, and dental hygiene to education, history, and neuroscience. Representatives from the Senate and House of Delegates of the West Virginia State Legislature visited presenters from their districts to learn about research at the undergraduate level and how congressional action - policy and budget allocations - support research and creative endeavors. The 17th annual URDC Event is set to take place on Friday, February 7, 2020.



WVU's 2019 URDC presenters pose in front of the Capitol Building after their morning presentations.
(Photo Credit: Kevin Walden)

UNDERGRADUATE SPRING SYMPOSIUM

The 3rd Annual Undergraduate Spring Symposium was held on Friday, April 12 and Saturday, April 13, 2019. Nearly 200 undergraduate students from wide-ranging disciplines explained the results of their discipline-specific scholarly activity (research/creative projects) to attendees to show them what amazing work our undergraduates are doing. Most presentations were poster format, but six students chose to showcase their research through oral presentations. Our undergraduates enthusiastically represented WVU to prospective students and their parents who were attending Decide WVU Day.

The Office of Undergraduate Research and the Honors College in conjunction with Undergraduate Admissions, Eberly College's SpeakWrite initiative, and the Intercollegiate Biochemistry Program, worked together to organize this campus-wide, culminating event whilst encouraging prospective students to decide on attending WVU. Judges for the spring symposium mainly consisted of WVU graduate students. A minimum of 34 graduate students volunteered as judges and provided valuable in-person and written feedback to the presenters. We were gratified at the willingness of WVU's graduate students to give back to the research community of practice and to support our undergraduate researchers. We will continue this event in spring 2020 with the 4th Annual Undergraduate Spring Symposium where we expect to increase the number of students giving oral presentations and extend creative works to include visual and performing arts. Be sure to save the dates of April 3-4, 2020 for the 4th Annual Undergraduate Spring Symposium.



Oral presenters in action during the 3rd Annual Undergraduate Spring Symposium on April 12, 2019. Two oral presenters came to campus from WVU Institute of Technology. (Photo Credits: Kimberly Quedado)

Category winners and runners-up (bold = undergraduate presenter; underline = faculty mentor) from the 2019 Undergraduate Spring Symposium were:

Human Engagement Oral Presentations (3 total)

Winner: *Why the South Carolina Negro Code of 1740 Matters in 2019*. **Kayla Tokar** (Kayla is a Music major at WVU from Uniontown, PA. Kayla is a student ambassador for the WVU Office of Undergraduate Research and participated in both the pilot (2017-2018) Research Apprenticeship Program and the 2018 Summer Undergraduate Research Experience.)

Science & Technology – Oral Presentations (3 total)

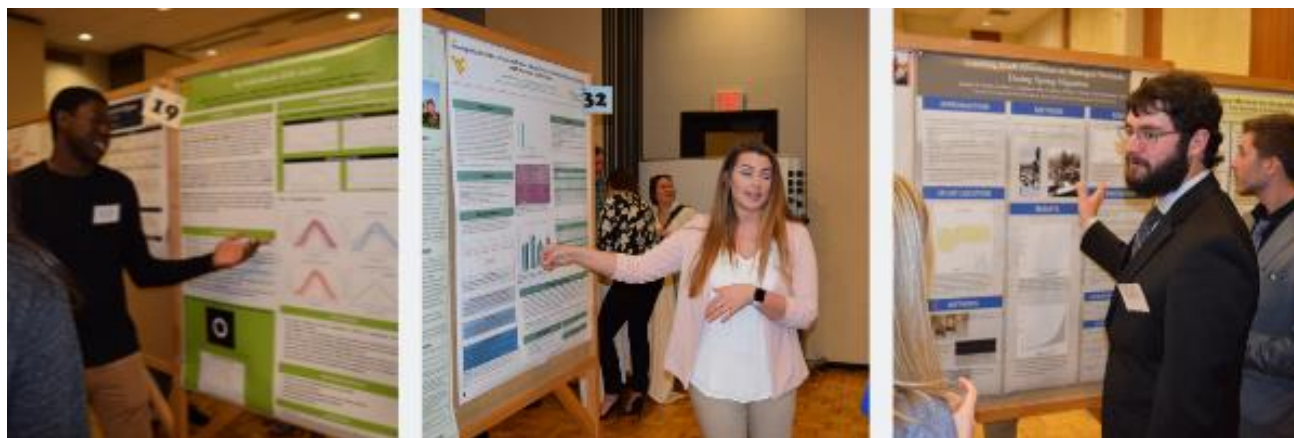
Winner: *Antagonism of Naturally Occurring Bacterial Isolates Against Staphylococcus aureus: A Search for Novel Probiotics*. **Brittan McClain** and Matthew Williams (Brittan is a Biology major at WVU Institute of Technology from Dixie, WV. Brittan carried out research for WVU 497-level research course credit.)

Agricultural & Environmental Sciences – Poster Presentations (25 posters)

1st Place: *Urban Legacies: Linking Glass Manufacturing to Soil Pollution in Morgantown, WV.* **Kailee Gokey**, Chase Mowery, Erin Mates, Randy Toth, and Ken Brown (Kailee is a Geology major at WVU from Sutton, WV. Kailee carried out research for her Environmental Geoscience Capstone course.)

2nd Place: *Characterization of Yeast and Bacteria on Cider Apples in West Virginia.* **Logan Webb**, April Kessel, Michael Gutensohn, and Ember Morrissey (Logan is an Exercise Physiology major at WVU from Morgantown, WV. Logan carried out research using a Research and Scholarship Award.)

3rd Place: *Selection of Rams for Reduced Parasite Fecal Egg Count Reduces Parasite Burden in Progeny.* **Allison B. Farley**, A. R. Weaver, S.P. Greiner, and S.A. Bowdridge (Allison is an Animal and Nutritional Sciences major at WVU from Saint Albans, WV. Allison was a participant in WVU's Research Apprenticeship Program.)



Behavioral & Social Sciences – Poster Presentations (36 posters)

1st Place: *The Cannabinoid Drug ZCZ011 Does not Alter Anxiety or Reward in Mice.* **Brian Kotson**, Kristen Trexler, and Steven Kinsey (Brian is a Psychology major at WVU from Glen Dale, WV. Brian was a participant in WVU's Research Apprenticeship Program.)

2nd Place: *See - Do Correspondence in a Pigeon.* **Virginia Milleon** and Kennon Lattal (Virginia is a Neuroscience & Psychology double major at WVU from Summit Point, WV. Virginia carried out research for WVU 497-level research course credit.)

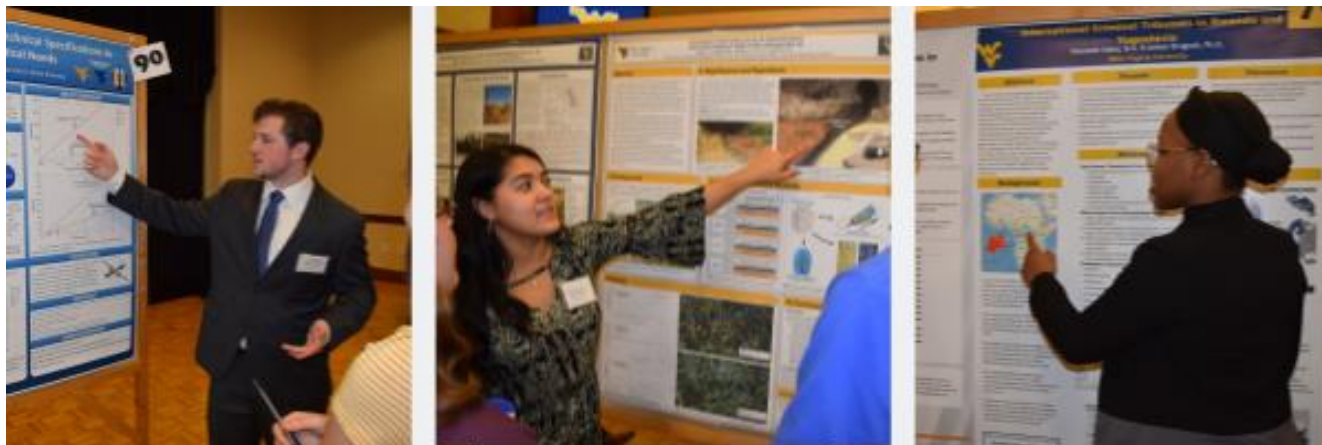
3rd Place: *Effect of Manner of Articulation on Different Types of Variance During Speech Motor Learning.* **Jacob Cahn** and Kimberly Meigh (Jacob is a Speech Pathology and Audiology major at WVU from Morgantown, WV. Jacob was a participant in the 2018 Summer Undergraduate Research Experience.)

Biological & Biochemical Sciences – Poster Presentations (36 posters)

1st Place: *NMNAT1, a Protein Associated with Blinding Disease, is Crucial for Retinal Development and Stability.* **David Sokolov**, Emily Sechrest, Joseph Murphy, Yekai Wang, Jianhai Du, Peter Mathers and Saravanan Kolandaivelu (David is a Biology and Mathematics double major at WVU from Morgantown, WV. David carried out research for Biology 486 Capstone credit.)

2nd Place: *The Genetic Underpinnings of Symbiosis Between The Ambrosia Beetle *Euwallacea Validus* and *Fusarium Oligoseptatum*.* **Fady Wasef**, Elaina Spahr, and Teiya Kijimoto (Fady is a Biology major at WVU from Morgantown, WV. Fady carried out research for Biology 486 Capstone credit.)

3rd Place: *Studying Development of the Hypothalamus in genomic screen homeobox 1 Mutant Zebrafish.* **R. Madison Riffe**, Samantha L. Phelix, Sarah N. Peterson, Rebecca A. Coltogirone, and Sadie A. Bergeron (Madison is a Biology major at WVU from Charleston, WV. Madison participated in the 2018 Summer Undergraduate Research Experience and furthered her research with WVU Honors EXCEL Enrichment Funds.)



Health Sciences – Poster Presentations (32 posters)

1st Place: *Identification of a Sulfonamide Analog that Reduces Cell Viability in B-cell Acute Lymphoblastic Leukemia.* **Nolan R. Holley**, Debbie Pikel, Werner J. Geldenhuys, Karen H. Martin, Bin Su and Laura F. Gibson (Nolan is a Biochemistry major at WVU from Ripley, WV. Nolan was a participant in the 2018 WVU Cancer Research Fellowship program.)

2nd Place: *Turning on a Split-Belt Treadmill Using Virtual Reality.* **Lindsay Reese**, Matthew Boots, Anton Sobinov, Trevor Moon and Sergiy Yakovenko (Lindsay is an Exercise Physiology major at WVU from New Stanton, PA. Lindsay was a participant in WVU's Research Apprenticeship Program.)

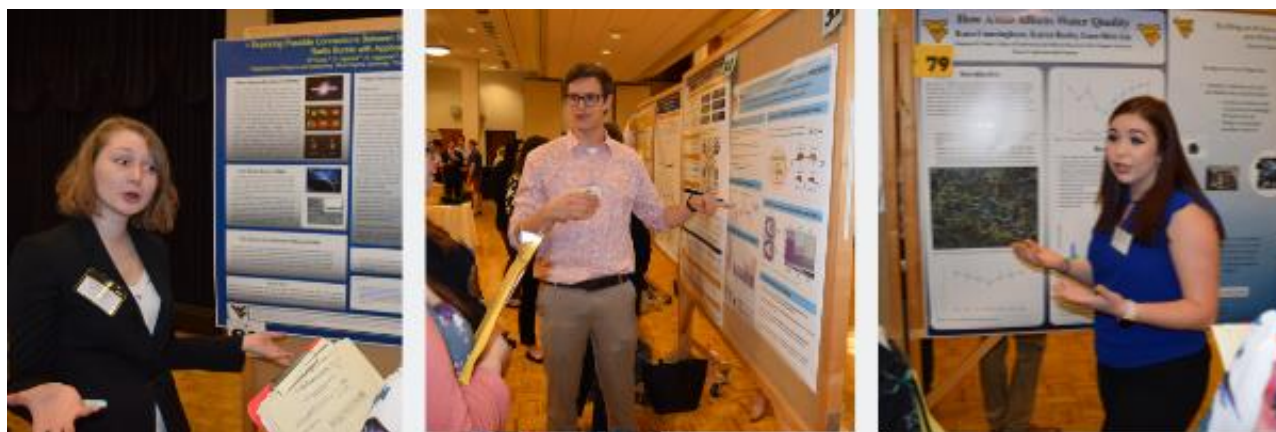
3rd Place: *Optimizing Protocols for the Development of Polyclonal Antibody Treatments Against Pseudomonas aeruginosa.* **Aaron C. Malkowski**, Emel Sen-Kilic, Justin Bevere, Catherine Blackwood, and Mariette Barbier (Aaron is an Immunology & Medical Microbiology major at WVU from Mount Holly, NJ. Aaron is a student ambassador for the WVU Office of Undergraduate Research and participated in the pilot Research Apprenticeship Program.)

Human Engagement – Poster Presentations (20 posters)

1st Place: *Airline Dissolution.* **Cornell Brown**, Gulnara Zaynutdinova, and Olga Bruyaka Collignon (Cornell is a Marketing major at WVU from Nottingham, MD. Cornell was a participant in WVU's Research Apprenticeship Program.)

2nd Place: *Let the Storm Rage On: Reevaluating Misconceptions Regarding the Alaska Native Claims Settlement Act.* **Michael V. Amato** (Michael is a Political Science, History, and World Languages triple major at WVU from Rochester, MA. Michael's research efforts were mainly voluntary.)

3rd Place: *Peer Feedback on Revisions & Implementation.* **Joseph Ashton**, Morgan Goode, and Melissa Patchan (Joseph is an Electrical Engineering major at WVU from Inwood, WV. Joseph was a participant in WVU's Research Apprenticeship Program.)



Physical Sciences & Engineering – Poster Presentations (35 posters)

1st Place: *Temperature Ramp and Reaction Time Variances Affect Size and Chemistry of Manganese Oxide Nanoparticles.* **Alexander Pueschel**, Celia Martinez De La Torre, Jasmine Grossman, and **Margaret Bennewitz** (Alexander is a Biomedical Engineering major at WVU from Rosedale, MD. Alexander was a participant in WVU's Research Apprenticeship Program.)

2nd Place: *The Development and Integration of Air-Brake Systems on a Small-Scale Rocket.* **Abednego Abdi** and **Patrick Browning** (Abednego is a Mechanical and Aerospace Engineering double major at WVU from Martinsburg, WV. Abednego was a participant in WVU's Research Apprenticeship Program.)

3rd Place: *How Acid Mine Drainage Affects Water Quality.* **Kara Cunningham**, Karen Buzby, and **Lian-Shin Lin** (Kara is a Civil and Environmental Engineering major at WVU from Hamlin, WV. Kara was a participant in WVU's Research Apprenticeship Program.)

SUMMER UNDERGRADUATE RESEARCH SYMPOSIUM

The Summer Undergraduate Research Symposium has served as the culminating event for summer undergraduate research programs across the WVU campus since 2009. This symposium provides presenters with a similar experience to that of a disciplinary conference. Presenters prepare professional quality research and creative posters and use poster visuals to explain their research to faculty members, students, and to members of the general public. In the morning, presenters are judged on their poster and their ability to explain and answer questions about their research to judges from the same or a related field. Having judges assess each poster gives all presenters a guaranteed opportunity to present to someone one-on-one, give their oral presentation, and answer questions about their research.

The 11th annual Summer Undergraduate Research Symposium was hosted by the WVU Office of Undergraduate Research on Thursday, July 25, 2019 at the WVU Erickson Alumni Center. Of the 117 undergraduate presenters, 87 attended WVU and 30 were visiting students from the institutions indicated below.

Posters were divided into eight different judged categories (Agricultural & Environmental Sciences, Biological Sciences, Engineering, Health Sciences, Human Engagement, Neuroscience, Physical Sciences, and Social & Behavioral Sciences) with a total of 19 judges. Ten (10) judges were WVU faculty members and nine (9) were WVU graduate students who subsequently tracked their service hours through iServe. The Human Engagement category included research and scholarship pertaining to how humans interact and engage within society in the areas of business, education, creative arts, and the humanities. The WVU community, the presenters' research groups, as well as the general public, including family, were invited to attend. Nine (9) rising freshmen students matriculating into WVU and participating in the NSF INCLUDES First2 Network's two-week summer immersion program also attended.

Institutions Represented by Visiting Students Who Presented at the Symmer Symposium



Eight presenters were selected as winners in their categories and four presenters were selected as runners-up. Category winners and runners-up (bold = undergraduate presenter; underline = faculty mentor) from the 2019 symposium were:

Agricultural & Environmental Sciences Category (9 posters)

Winner: *Microbial Growth of Hydrocarbon Degrading Organisms in Produced Water.* **Adrian Romero**, Shawn T Grushecky, Zachary Freedman and Edward F Peltier. (Adrian, a Chemical Engineering major at the University of Kansas, was a participant in the Undergraduate Water and Energy Systems Scholars program.)

Biological Sciences Category (17 posters)

Winner: *Characterizing Plasmid Functional Roles within Tsetse Fly-Associated Symbiotic Bacteria.* **Noah J. Spencer**, Miguel E. Medina Munoz, and Rita V.M. Rio. (Noah, a Biology major and Honors student at WVU from Morgantown, WV, was a participant in the SURE program.)

Runner-Up: *Tissue Specific Nitrogen Metabolism by Retina and Retinal Pigmented Epithelium.* **Brianna Ritz**, Rong Xu, and Jianhai Du. (Brianna, a Biology major at West Liberty University, was a participant in the Summer Undergraduate Vision Research Fellowship program.)

Engineering Category (15 posters)

Winner: *Multi-Source Domain Adaptive Segmentation of Microscopy Images.* **Jacob Restanio**, Liam Mcgoldrick, and Gianfranco Doretto. (Jacob, a Computer Engineering major at WVU from Houston, PA, was a participant in the SURE program.)

Runner-Up: *Quantifying United Nations Sustainable Development Goals Using GREENSCOPE Indicators.* **Carlie B. Ramsayer**, Selorme Agbleze, Gerardo J. Ruiz-Mercado, and Fernando V. Lima. (Carlie, a Chemical Engineering major and Honors student at WVU from Madison, WV, was a participant in the SURE program.)

Health Sciences Category (20 posters)

Winner: *Making a Case for Treating Substance Use Disorder: A Family Disease.* **Brittany T. Smith**, Michael R. Brumage, Keith Zullig, and Elizabeth Claydon. (Brittany, a Public Health major at WVU from Morgantown, WV, was a participant in the SURE program.)

Runner-Up: *Developing novel biomarker-based in vitro pertussis toxin neutralization assay to evaluate protective antibodies.* **Caleb Kisamore**, Dylan Boehm, M. Allison Wolf, William Witt, and F. Heath Damron. (Caleb, an Immunology and Medical Microbiology major and Honors student at WVU from Morgantown, WV, was a participant in the IMMB Research Internship program.)

Human Engagement Category (8 posters)

Winner: *Between two worlds: power, politics, and noblewomen in early modern Europe.* **Jessica Hogbin** and Matthew Vester. (Jessica, a History, Italian & Religious Studies triple major and Honors student at WVU from Hedgesville, WV, was a participant in the SURE program.)

Neuroscience Category (10 posters)

Winner: *Timing of Audiovisual Integration in Individuals with Autism.* **Kingsly C. Jonathan**, Paula J. Webster, John Bassler, Sijin Wen, Frum Chris, James W. Lewis, and Shuo Wang. (Kingsly, a Biomedical Engineering major and Honors student at WVU from Cross Lanes, WV, was a participant in the SURE program and was funded via an NSF LSAMP STEM Pathways and Research Alliance Phase III grant.)

Physical Sciences Category (19 posters)

Winner: *Zirconium Compounds as Earth-Abundant Alternatives for Precious Metal Photosensitizers.* **Rebecca Rutherford**, Dylan Leary, Jordan Martinez, and Carsten Milschmann. (Rebecca, a Chemistry major at Fairmont State University from Nellis, WV, was a participant in the NSF-funded Chemistry REU program.)

Runner-Up: *Demonstration of Semi-permanent Cationic and Anionic Surface Coatings for Capillary Electrophoresis.* **Alyson K. Fulton**, Courtney J. Kristoff, and **Lisa A. Holland**. (Alyson, a Chemistry major at Shippensburg University from Fairfield, PA, was a participant in the NSF-funded Chemistry REU program.)

Social & Behavioral Sciences Category (9 posters)

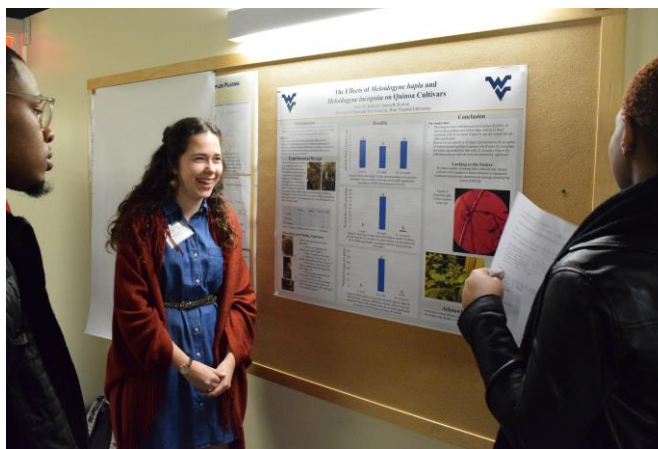
Winner: *Associations between Parental Attachment, Delaying Gratification, and Substance Use in Adolescents.* **Malinda Smith**, **Amy Gentzler**, Tyia Wilson, and Jeffrey Hughes. (Malinda, a Psychology and Social Work double major at Barton College, was a participant in the APA funded Summer Undergraduate Psychology Research Experience.)



Category winners and runners-up from the 2019 Summer Undergraduate Research Symposium held at West Virginia University on July 25, 2019. (Photo Credit: Kayla Tokar)

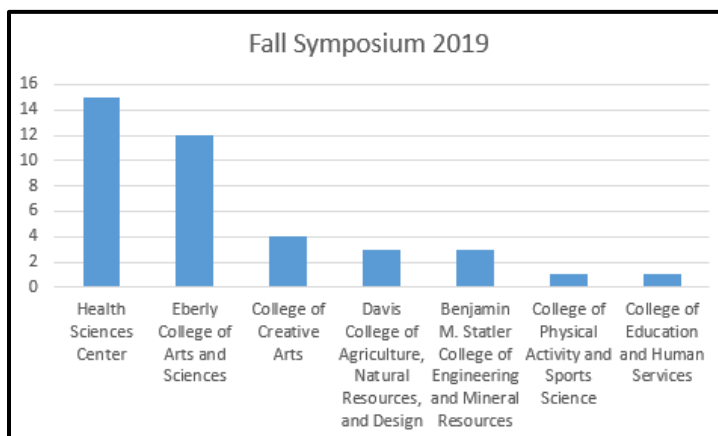
FALL RESEARCH SYMPOSIUM - RAP

In December 2018, the Research Apprenticeship Program (RAP) hosted its first fall symposium. The symposium, which was held in White Hall, gave second-semester RAP students the opportunity to present their research to professors, peers, and first-semester RAP students. Seventeen (17) total student presenters shared their research at one of two separate poster sessions, held on December 3-4, 2018.

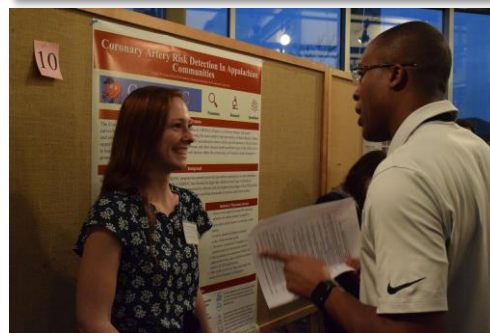
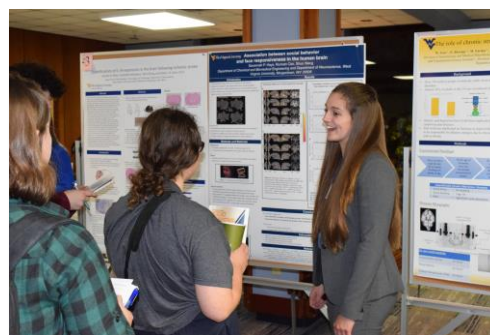


Anne Kinkopf presenting research at the fall 2018 RAP symposium.

In November 2019, the RAP program held its second fall symposium for second-semester RAP students in the Mountainlair. This symposium had a total of 39 student presenters and five separate sessions with 32 poster presenters. Seven (7) advanced students chose instead to disseminate their research through oral presentations with faculty mentors, professors, peers, and first-semester RAP students in attendance. What a great way to inspire our first-semester RAP students to continue their research! The quality of the posters, the confidence of the oral presenters, and the enthusiasm for research displayed by all presenters was impressive and will sustain UGR for many months to come.



Fall Symposium 2019: Number of RAP presenters from WVU colleges and centers indicating broad disciplinary representation in research.



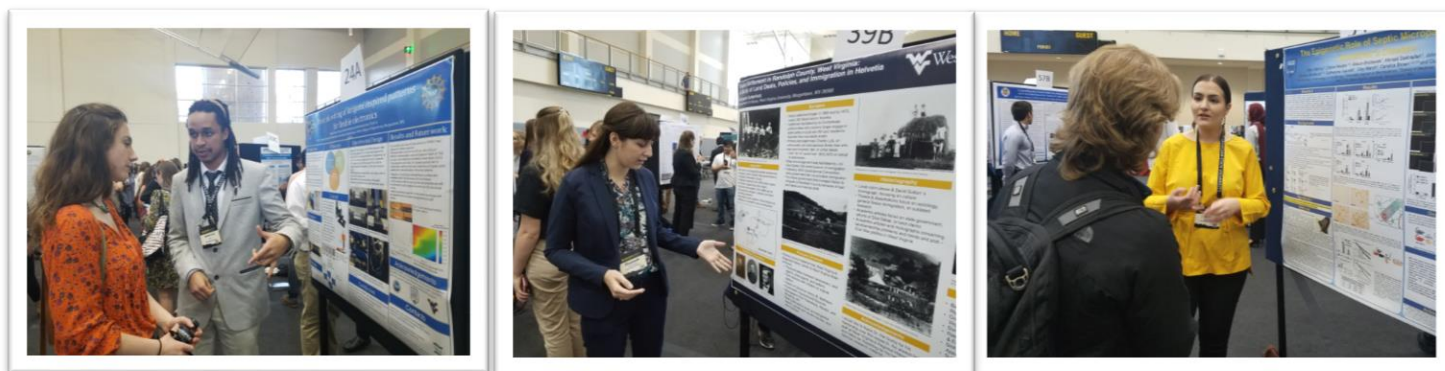
Savannah Hays (top), Cierra Bedard (middle), and Katherine Sauvageot (bottom) presenting research at the fall 2019 RAP symposium.

NATIONAL CONFERENCE ON UNDERGRADUATE RESEARCH (NCUR)

Since 1987, NCUR has served as the Council on Undergraduate Research's signature undergraduate research event. It is dedicated to promoting and celebrating undergraduate research and creative endeavors in all fields and from undergraduates attending institutions nationwide. Students submit an abstract of their research or creative work and are competitively selected to present their work in forms such as oral, poster, or visual and performing arts. NCUR presenters also experience one of the largest graduate school expos in the country, attend plenary lectures, mentoring and leadership sessions, and network with undergraduates and faculty from other institutions. Since 2015, WVU has been represented by 19 students at NCUR, with an increase in representation beginning with the establishment of the Office of Undergraduate Research.



WVU had eight undergraduate students selected to present their research at NCUR held at the Kennesaw State University (Kennesaw, GA) from April 11-13, 2019. Kevin Walden, UGR Program Coordinator, accompanied students at NCUR.



Poster Presentation: *Extraction of Rare Earths from Coal Fly Ash by Microwave-Assisted Technology.* **Daniel Baker** (Daniel, a chemical engineering major at WVU from Glen Dale, WV, carried out research with Dr. Ed Sabolsky.)

Poster Presentation: *Understanding of Combustion: Gas Phase Kinetics of the CH Radical and Cyclopentadiene Reaction.* **Zachery Donnellan** (Zachery, a chemistry major at WVU from Chapmanville, WV, carried out research with Dr. Fabien Goulay.)

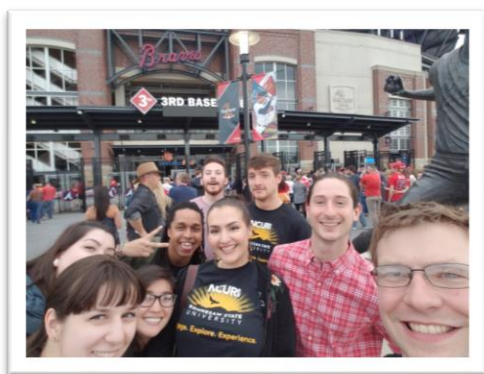
Poster Presentation: *Humoral (B Cell) Immune System Imbalance is Associated with Development of Depressive-like Phenotype.* **Liza Grossman and Brishti White** (Liza, a chemistry major from Grafton, WV, and Brishti, a psychology major from Morgantown, WV, carried out research with Dr. Elizabeth Engler-Chiurazzi.)

Poster Presentation: *Fabrication of Kirigami Based structures for Flexible Electronics Applications.* **Muriithi-David Kem** (Muriithi-David, a mechanical and aerospace engineering major at WVU from Kennesaw, GA, carried out research with Dr. Kostas Sierros.)

Poster Presentation: *Swiss Settlement in Randolph County, West Virginia: A Study of land Deals, Policies, and Immigration.* **Elizabeth Satterfield** (Elizabeth, a history major at WVU from Independence, WV, carried out research with Dr. William Gorby.)

Poster Presentation: *Coding a Path Through High-Quality Feedback.* **Colter Uscola** (Colter, a sociology major at WVU from Morgantown, WV, carried out research with Dr. Melissa Patchan.)

Poster Presentation: *The Epigenetic Role of Septic Microparticles in Alzheimer's Disease.* **Mya Vannoy** (Mya, an immunology and medical microbiology major at WVU from Cross Lanes, WV, carried out research with Dr. Duaa Dakhallah.)



POSTERS ON THE HILL

Two WVU students, Jessi Tyo and Caroline Leadmon, were selected to represent West Virginia and WVU at the Council on Undergraduate Research's 23rd annual Posters on the Hill (POH) event in Washington, D.C. on April 29-30, 2019. Under the direction of Dr. Daniel Panaccione (Mycology), Jessi and Caroline presented their research on ergot alkaloids – toxic compounds produced by fungi. By presenting at POH, Jessi and Caroline join a select group of students who went through a rigorous and highly competitive review process to present their research at the U.S. capitol. In 2019, 73 undergraduate researchers from across the nation were invited to this conference. Prior to attending, Jessi and Caroline were trained in advocacy by Suzanne Bentzel, WVU's Director of Federal Relations. They met with congressional staff members, federal government officials, and representatives from federal funding agencies before and during their poster presentation at POH.

Poster Presentation: *Production of pharmaceutically and agriculturally important ergot alkaloids by the fungus *Metarhizium brunneum* and their significance in insect pathogenesis.* **Jessi Tyo and Caroline Leadmon** (Jessi (top photo), a biology major at WVU from Gassaway, WV, and Caroline (bottom photo), a biochemistry and animal and nutritional sciences double major at WVU from Hurricane, WV, engaged in research with Dr. Daniel Panaccione.)

"I am excited to represent West Virginia and West Virginia University on a national level. As an R1 institution, WVU performs some of the best work in the world. It is an honor to be able to contribute to this body of work, especially as an undergraduate student"

- Caroline Leadmon

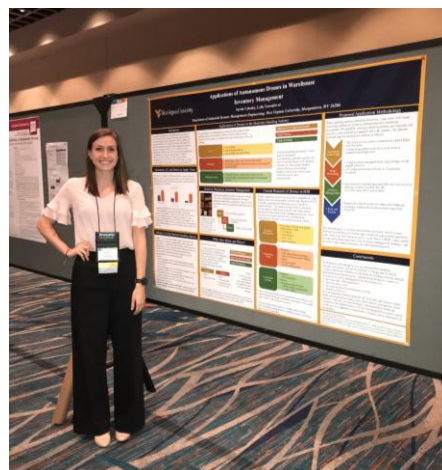


Dr. Daniel Panaccione, Jessi Tyo, and Caroline Leadmon discussing research prior to the 2019 Posters on the Hill event.



TRAVEL AWARDS – BEYOND WEST VIRGINIA

Besides funding student presentations of their scholarly activities at national CUR events (e.g., NCUR and Posters on the Hill) and at the statewide Undergraduate Research Day at the Capitol, UGR offers competitive travel funding, much of which is connected to participation in summer research programming (i.e., SURE enrichment funding). Travel funding offsets the costs associated with attendance and presentation (oral or poster) of research or creative work at national or regional discipline specific conferences. The application process is competitive. Students must (i) provide the submitted abstract and proof of its acceptance, (ii) devise and submit a realistic travel budget, and (iii) provide a letter of support from their faculty research mentor.

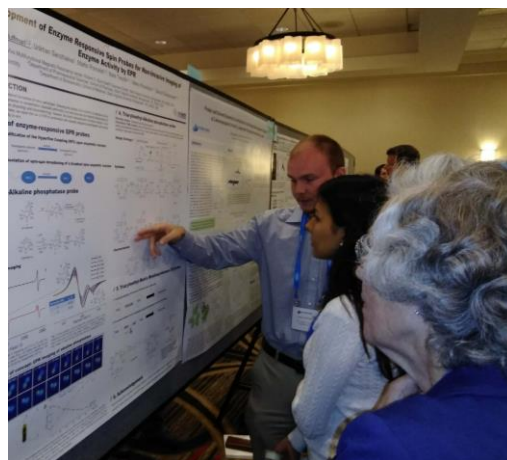


In 2019, presentations by the undergraduate students listed in Table 1 have been partially supported by the Office of Undergraduate Research. The figure shown after the table documents the wide geographic reach of WVU undergraduates as they traveled throughout the United States and internationally in the last year to represent West Virginia University at conferences and events.

Justin Huffman (top; Chemistry major from Talcott, WV) presenting his SURE research at the Rocky Mountain Conference on Magnetic Resonance in Denver, CO in July 2019. Justin won a prize for his presentation at this international conference.

"Undergraduate research allows you to make connections with graduate students and professors that would not be available from classroom experiences. Additionally, research allows students to learn about complex topics in detail, some of which are entirely omitted from the undergraduate curriculum, and thus challenges you to learn difficult topics from experts in their field of research."

- Justin Huffman



Brittany Smith (bottom; Public Health major from Bluefield, WV) at the Coliseum in Italy after presenting her research internationally at the 26th Annual International Society for Research on Identity (ISRI) Conference in Naples, Italy in May 2019.

"What I like the most about research is being able to prevent suffering through answering questions and digging deeper into some of society's most pressing issues."

- Brittany Smith



Table 1. Undergraduates supported in travel to present their scholarly activities at national or regional discipline-specific conferences. Presentations partially supported using SURE enrichment funds are designated with a superscript S. Presentations partially supported using UGR travel funding are designated with a superscript T.

Undergraduate Presenter(s) (Major)	Faculty Mentor	Presentation Title	Conference Title, Location	Conference Dates
WVU Steel Drum Band: Nick Delancey, Dimitri Georgantonis, Peter Handerhan, Nataniel Kaniecki, Jacob Kiehl, Joseph Lucey, Braden Macchia, Raymond Mason, Elizabeth Rockwell, Brandon Russi, Timothy Scheuvront, Robert Shamblen, & Drew Simonette ^T	Michael Vercelli	Performance at the Percussive Arts Society International Convention (PASIC) in honor of the late WVU artist-in-residence Dr. Ellie Mannette	Percussive Arts Society International Convention, Indianapolis, IN (30)	Nov. 13-17, 2019
Hunter Moore^S (Aerospace Engineering)	Christopher Griffin	<i>Optimization of Vicon Motion Capture Marker Placement Distribution Using Computational Symmetry</i>	American Institute of Aeronautics and Astronautics (AIAA), Laurel, MD (29)	Nov. 14-15, 2019
Carlie Ramsayer^S (Chemical Engineering, Biomedical Engineering)	Fernando Lima	<i>Quantifying United Nations Sustainable Development Goals Using Greenscope Indicators</i>	American Institute of Chemical Engineers (AIChE), Orlando, FL (28)	Nov. 10-15, 2019
Caitlin Mickles^T (Immunology and Medical Microbiology)	Stacey Anderson	<i>Classification of Chemical Hypersensitivity Potential Based on Gene Expression Profiles</i>	2019 Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS) Nation Diversity in STEM Conference, Honolulu, HI (27)	Oct. 30-Nov. 3, 2019
Mya Vannoy^T (Immunology and Medical Microbiology)	Duaa Dakhallallah	<i>Septic Extracellular Vesicles Accelerate Onset and Severity of Alzheimer's-Like Pathology</i>	2019 Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS) Nation Diversity in STEM Conference, Honolulu, HI (26)	Oct. 30-Nov. 3, 2019
Alexandre Ziegelmeier^S (Chemistry)	Gregory Dudley	<i>Broadening the Understanding of Selective Microwave Heating on the 1,2-Meisenheimer Rearrangement</i>	71 st Annual Southeastern Regional Meeting of American Chemical Society, Savannah, GA (25)	Oct. 20-23, 2019
Lauren Giesler^S (Psychology)	Cole Vonder Haar	<i>Frontal Traumatic Brain Injury Reduces the Reinforcing Effects of Auditory Cues in Rats</i>	2019 Society for Neuroscience Conference in Chicago, IL (24)	Oct. 19-23, 2019
Hannah Cohen^S (Biomedical Engineering)	Jessica Allen	<i>Scaling of Muscles in Young Adults While Experiencing External Disturbances During Sit-to-Stand Motion</i>	2019 Biomedical Engineering Society (BMES) Annual Conference, Philadelphia, PA (23)	Oct. 16-19, 2019

Bethany Wager ^T (Wildlife & Fisheries Resources)	Kyle Hartman	<i>Using Sex Ratios of Brook Trout to Identify Population Resilience and Spawning Adult Size Structure</i>	American Fisheries Society and The Wildlife Society 2019 Joint Annual Conference, Reno, NV (22)	Sept. 28-Oct. 4, 2019
Brittany Smith ^S (Public Health)	Michael Brumage	<i>Adverse Childhood Experiences and Trauma in Females Who Misuse Substances and Their Children: A Case-Control in West Virginia</i>	24 th International Summit on Violence, Abuse, and Trauma, San Diego, CA (21)	Sept. 5-8, 2019
Carlie Ramsayer ^S (Chemical & Biomedical Engineering)	Fernando Lima	<i>Quantifying United Nations Sustainable Development Goals Using GREENSCOPE Indicators</i>	Enterprise and Infrastructure Resilience Conference, Cincinnati, OH (20)	Aug. 12-13, 2019
Sydney Hull ^S (Psychology)	Claire St. Peter	<i>Evaluating Performance Feedback to Teach Classroom Management</i>	Wisconsin Association for Behavior Analysis (WisABA), Milwaukee, WI (19)	Aug. 9-10, 2019
Justin Huffman ^S (Chemistry)	Benoit Driesschaert	<i>Development of Enzyme Responsive Spin Probes for Non-Invasive Imaging of Enzyme Activity by EPR</i>	2019 Rocky Mountain Conference on Magnetic Resonance, Denver, CO (18)	July 21-24, 2019
Mariah Murray ^T (Chemistry)	Jessica Hoover	<i>C-H Trifluoromethylation of N-8-Quinolinylnbenzamide via Nickel Catalysts</i>	Northeast Regional Meeting of the American Chemical Society, Saratoga, NY (17)	June 23-26, 2019
Sarah Cokeley ^S (Industrial & Mechanical Engineering)	Leily Farrokhvar	<i>Application of Autonomous Drones in Warehouse Inventory Management</i>	Institute of Industrial and Systems Engineers Annual Conference, Orlando, FL (16)	May 18-21, 2019
Brittany Smith ^T (Public Health)	Megan Smith	<i>Negative Life Events and School Connectedness n Positive Identity Formation</i>	26 th Annual International Society for Research on Identity (ISRI) Conference, Naples, Italy (15)	May 13-15, 2019
Nathan Shull ^S (Environmental Geoscience)	Eungul Lee	<i>Change in Vegetation Greenness and its Impacts on Near-surface Climate Conditions in South-Central Appalachia</i>	American Association of Geographers (AAG) Annual Meeting, Washington, DC (14)	April 3-7, 2019
Zachery Donnellan ^S (Chemistry)	Fabien Goulay	<i>Kinetic investigations of the gas phase reaction between the CH radical and cyclopentadiene</i>	American Chemical Society (ACS) National Meeting, Orlando, FL (13)	Mar. 31-Apr. 4, 2019
Maxwell Reese ^S (Chemistry)	Brian Popp	<i>Influence of a second coordination sphere borane on rhodium (I) oxidative addition of chelating aldehydes</i>	American Chemical Society (ACS) National Meeting, Orlando, FL (12)	Mar. 30-Apr. 4, 2019
Lynsey Soule ^S (Biology)	Renee Nicholson	<i>Panelist for Towards a More Beautiful Clinic: Narrative Medicine and Expressive Arts at WVU Medicine</i>	2019 Appalachian Studies Association Conference, Asheville, NC (11)	Mar. 14-17, 2019
Neel Rao ^S (Sport & Exercise Psychology)	Peter Giacobbi	<i>Using Technology to Deliver Mind Body Interventions: Benefits, Challenges, and Future Directions</i>	Society of Behavioral Medicine's (SBM) 40 th Annual Meeting and Scientific Sessions, Washington, D.C. (10)	Mar. 6-9, 2019
Alix Gondringer ^T (Psychology)	Paul Hernandez	<i>Psychosocial Support and Professional Development among Female Undergraduate STEM Majors</i>	Eastern Psychological Association 2019 Conference, New York City, NY (9)	Feb. 28- Mar. 3, 2019
Amal Khan ^T (Psychology)	Paul Hernandez	<i>The Effect of Mentorship on Women's Self Efficacy</i>	Eastern Psychological Association 2019 Conference, New York City, NY (8)	Feb. 28- Mar. 3, 2019
Julie Gilmore ^T (Psychology)	Aaron Metzger	<i>Associations Between Psychological Control and Adolescent Depression: The Role of Organized Activities</i>	Eastern Psychological Association Annual Conference, New York City, NY (7)	Feb. 28- Mar. 2, 2019

Kelsey Barton ^T (Psychology)	Nicholas Turiano	<i>Personality Predicting Changes in Alcohol Consumption during the First Year of College</i>	Eastern Psychological Association Annual Conference, New York City, NY (6)	Feb. 28- Mar. 2, 2019
Sarah Whiteman ^T (Psychology)	Nicholas Turiano	<i>Personality Traits Predict Change in Depression Levels During the Transition to College</i>	Eastern Psychological Association Annual Conference, New York City, NY (5)	Feb. 28- Mar. 2, 2019
Samantha Mehnert ^S (Forensic & Investigative Sciences, Chemistry)	Glen Jackson	<i>Development of a Flexible Algorithm for Substance Identification Using Mass Spectrometry</i>	American Academy of Forensic Science's 71 st Annual Scientific Meeting, Baltimore, MD (4)	Feb. 18-23, 2019
Jordan Vance ^S (Immunology and Medical Microbiology)	Cory Robinson	<i>Changes in Myeloid-Derived Suppressor Cell function during neonatal sepsis</i>	Mid-Atlantic Microbial Pathogenesis Meeting, Wintergreen, VA (3)	Feb. 10-12, 2019
Kelsey Kinnamon ^T (Sport & Exercise Psychology)	Peter Giacobbi Jr.	<i>Usage, Feasibility, And Short- Term Outcomes of a Multi- Behavioral Mobile Health Application Using Guided Imagery for Pregnant Women</i>	29 th Annual Midwest Sport and Exercise Psychology Symposium, Lexington, KY (2)	Feb. 8-9, 2019
Eva MacFarland ^S (Psychology & Biology)	Natalie Shook	<i>Social Integration Moderates the Effect of Intergroup Contact on Prejudice Reduction</i>	Society for Personality and Social Psychology Conference, Portland, OR (1)	Feb. 7-9, 2019



SUMMER UNDERGRADUATE RESEARCH EXPERIENCE (SURE)

The WVU SURE Site was first funded in 2005 and has been continuously funded to 2019. Funding for the 2017-2019 SURE Site was provided by the WV Higher Education Policy Commission's Division of Science and Research along with funding committed by the WVU Colleges of Business & Economics, Creative Arts, and Physical Activity and Sport Sciences; Davis College of Agriculture, Forestry and Consumer Sciences; Eberly College of Arts and Sciences; Statler College of Engineering and Mineral Resources; Health Sciences Center; the Departments of Biology and Chemistry; Research Corporation; and the Provost's Office. ***In October 2019, UGR submitted a proposal for 3-year continuation funding of the SURE Site (2020-2022).***

The 2017-2019 SURE Site supported 50 undergraduates (44 STEM and 6 non-STEM) per summer in eight weeks of full-time, faculty mentored research. The goal was to move participants from research dependence toward research independence. Facilitated research, trainings, career mentoring seminars, networking events and research presentations (i.e., Summer Undergraduate Research Symposium) improved participants' understanding of the research enterprise and the value of continuing their education post-undergraduate. ***We are aware of 94 publications with SURE participants as undergraduate co-authors with 32 publications with 2017-2019 SURE participants as co-authors!***

A total of 65 undergraduates participated in the 2019 SURE Site. Fifty (50) undergraduates were funded by the WVU SURE Site. The remaining 15 undergraduates were funded through mechanisms such as faculty grants (e.g., NSF-LSAMP) or departmental funding. Over the summer, students constructed and completed a research project, received training in skills to support their research (e.g., responsible conduct of research, scientific search engines) and improved their research self-efficacy. Students participated in networking and career-focused workshops, and collaborated with fellow WVU SURE students, while receiving mentorship, through a one-credit research course. Students' SURE experiences have increased the students' understanding of the research enterprise (from project inception, attainment of funding, to research completion and dissemination of results) and awareness of their role in the research community's constant dialectic. Many SURE participants used enrichment funding (\$500/participant) (i) to present their SURE research at disciplinary conferences (see Table 1) or (ii) to purchase research supplies (e.g., mock crime scene samples for creation of forensics footwear database, survey participants incentive payments for study of white-collar criminals, paints and brushes for creation of original artworks).

We are fortunate to have faculty members willing and excited to mentor undergraduates in research. More than 57 individual faculty members mentored SURE participants in research during 2019 SURE program. Other WVU faculty members, staff, and graduate students offered workshops and trainings on a volunteer basis. A few examples of these offerings are shown in Table 2. We send a heartfelt thank you out to the entire WVU community without whom the SURE program would not be a success!



WVU's 2019 SURE participants after presenting their scholarly activities at the July 25, 2019 Summer Undergraduate Research Symposium. (Photo Credit: Kayla Tokar)

Table 2. Sampling of workshops, trainings and other events offered to SURE participants and the broader WVU community as part of the 2019 SURE program.

Title	Presenter
Planetarium Show (Dynamic Earth) & Observatory (14-inch Celestron telescope)	Haley Wahl, Planetarium Assistant Coordinator, Dept. of Physics & Astronomy
LaunchLab, Part I - Ideation & the Creative Process	Carrie White, Asst VP Entrepreneurship and Innovation, and Randolph Quinn, WVU LaunchLab
Interviewing Skills – Perform Under Pressure	Robert Barricelli, Career Development Specialist, Career Services Center, WVU
Graduate Life: The Real Story & Ice Cream Social	Kevin Walden, Program Coordinator, UGR and Shelly Quance, Director, WVU Office of Graduate Admissions and Recruitment
Writing Personal Statements – Telling your Story to Funders and Admissions Committees	Dr. Ryan Claycomb, Professor of English and Theatre & Acting Dean of the Honors College, WVU
National Science Foundation Graduate Research Fellowship	Leigh Pratt, Program Coordinator, ASPIRE Office
Undergraduate Panel for Current Upward Bound Students (5-7 students needed from range of majors)	Landon Southerly, Director, WVU Upward Bound/TRIO
Creating an Effective Research Poster	Dr. Michelle Richards-Babb, Professor of Chemistry & Office of Undergraduate Research Director, WVU
Career Mentoring Panel	Panelists: Jess White (NASA IV&V), Megan Kruger (WV Water Research Institute), Ross Brittain (WV DEP), & Bethany Hornbeck (Mother Communications Co.)



2019 SURE participants (Ineke Knudson, left and Tyler Richards, right) in their research spaces. SURE research encompasses all disciplines.

SUMMER RESEARCH PROGRAMMING – BEYOND SURE

The SURE program is one of several structured summer undergraduate research programs that take place on the WVU campus each summer. The SURE program mainly serves WVU students and funds 50 students per summer. In summer 2019, eight additional STEM majors from underrepresented populations were funded in SURE by the NSF-funded Louis Stokes STEM Pathways and Research Alliance Phase III grant (LSAMP-1826763; PI: David Miller). Seven other structured programs provided research opportunities for 30 visiting students through the funding sources given below.



- **Chemistry REU (PI: Brian Popp, co-PI: Michelle Richards-Babb)** National Science Foundation (NSF) Division of Chemistry (CHE 1852369) with recreational activities funded by WVU Research Corporation and the WVU Eberly College of Arts and Sciences.
- **Robotics REU (PI: Yu Gu, co-PI: Jason Gross)** National Science Foundation (NSF) Division of Computer Science and Engineering (CSE-1851515).
- **Immunology and Medical Microbiology Research Internships (Coord: John Barnett and Rosana Schafer)** Financial support for the internships comes from the Department of Microbiology, Immunology and Cell Biology.
- **WVU Cancer Institute Summer Undergraduate Research Program (Coord: Alexey Ivanov)** Financial support for the fellowship program comes from the Edwin C. Spurlock Fellowship Fund, the Edward L. Reed Cancer Research Endowment, the Dr. David B. McClung Cancer Research Endowment Fund, and the Joe Marconi Cancer Research Fellowship Endowment.
- **Undergraduate Water and Energy Systems Scholars (Director: Shawn Grushecky)** Funded under the NSF EPSCoR project “Improving Water Management, Treatment and Recovery in Oil and Gas Production” – a joint project between the University of Kansas and WVU.
- **Summer Undergraduate Psychology Research Experience (PI: Natalie Shook)** Funded by the American Psychological Association’s Summer Undergraduate Psychology Research Experience program with support from WVU’s Office of the Provost and Department of Psychology.
- **Summer Undergraduate Vision Research Fellowship (PI: Jianhai Du)** Funded by the WVU Health Sciences Center Research and Graduate Education and the Department of Ophthalmology.



UGR works with program directors and faculty members to coordinate educational programming including professional development. All students participating in summer undergraduate research or creative endeavors at WVU are invited to submit an abstract for and present their research in poster form at the Summer Undergraduate Research Symposium. Of the 117 undergraduates involved in summer research (i) 109 were involved through a structured summer program and 8 were volunteering in research; (ii) 87 (74%) were WVU students and 30 (26%) were visiting students; and (iii) all presented at the 2019 Symposium.

In July 2019, WVU through the Office of Undergraduate Research was one of four West Virginia institutions to host a First2 Network Summer Immersive Research Experiences site for rising freshmen, first-generation college students intending to major in STEM disciplines. The First2 Network is funded by an NSF INCLUDES grant. The goal of the First2 Network is to double the graduation rate of STEM majors in West Virginia in 10 years. The First2 Network focuses on first-generation college students and other underrepresented students in their first two years of college and is engaging in forming statewide collaborations between academia, industry, non-profits, state government and K-12.



A total of nine rising freshmen WVU students attended the two-week site and engaged in research, team-building, formation of the cohort, and acclimation to academia. Two advanced undergraduate mentors, Abby Sine (mathematics) and Zachery Donnellan (chemistry), both of whom are also first-generation college students, aided in internship planning and provided near-peer mentoring for the duration of the two-week site and beyond.

Two research projects, mathematics and chemistry, were available for site participants. The math project was entitled “Application of UAVs to Optimize Search and Rescue Missions.” Dr. Marjorie Darrah and graduate student Jesse Cook were the main supervisors of this project. The project focused on developing an algorithm for use of UAVs in search and rescue missions. The chemistry-education project was entitled “Contextualizing Chemistry Labs.” Dr. Betsy Ratcliff and postdoc Dr. Roshan Lamichhane supervised this project. This project focused on developing new experiments to better engage students’ interest in the laboratory portion of the general chemistry course. For instance, participants analyzed food dye content in sports drinks using Beer’s law. Projects culminated with all participants presenting their research in oral form followed by the opportunity to interact with advanced undergraduate researchers at WVU’s Summer Undergraduate Research Symposium.



Participants and mentors engaged in UAV research during the Summer Immersive Research Experience sponsored by the NSF INCLUDES-funded First2 Network.

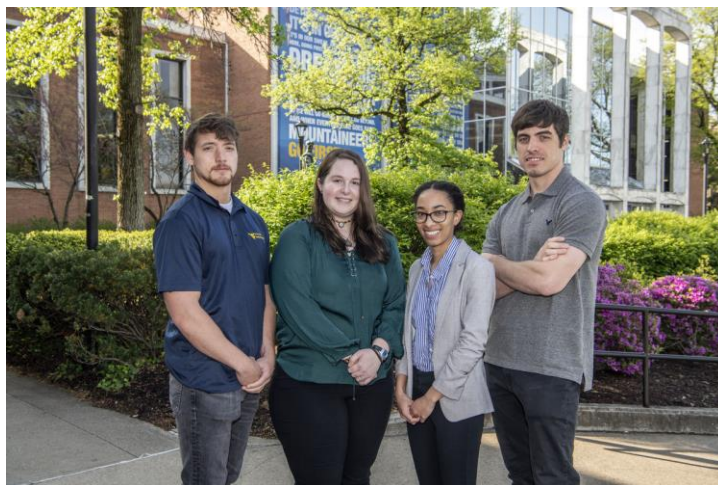
Many WVU-affiliated persons were heavily involved in ensuring the success of WVU’s 2019 First2 Network Summer Research Immersion. Michelle Richards-Babb, Director of UGR, was responsible for overall program administration and its ultimate success. Michelle Paden, WVU’s First Gen Program Coordinator, met with the participants during two group dinners. At the first, Paden discussed financial aid and federal work study and general struggles encountered by first-semester college freshmen, especially those who are first-generation. At the second, she assisted, Kathryn Williamson, Teaching Assistant Professor of Physics, in discussing the work of the First2 Network – its goals and its focus on student leadership – and the benefits of cohort formation from the summer immersion experience. Paden also made the arrangements for and her First Gen Office paid for the group’s culminating trip (July 24) to PNC Park in Pittsburgh, PA for WVU Day at Pirates Baseball.

The internship was assessed by the First2 Network’s evaluation team (Caitlin Howley) using pre- and post-surveys. Preliminary results across all four internships indicate that

“...in sum, we observed statistically significant increases between pre- and post-tests for four of the five subscales (the subscale about major/career plans was the one in which we didn’t see significant changes). So interns’ ratings on the STEM efficacy, sense of school belonging, STEM identity, and STEM plans subscales all increased more than we’d expect just by chance.”

NIST SURF – RESEARCH BEYOND WVU

Each year, the Office of Undergraduate Research supports WVU students applying for Summer Undergraduate Research Fellowships (SURF) at the National Institute of Standards and Technology. NIST has governmental research laboratories in Gaithersburg, MD and Boulder, CO. The SURF program provides undergraduates with an 11-week paid summer research experience at NIST. The Gaithersburg, MD program accepts 120+ students and the Boulder, CO program accepts only 20 students each summer from a nationwide, competitive, pool of applicants. Since 2016, WVU students have been successful in their SURF applications with 10 participants (3 in 2016, 2 in 2017, and 5 in 2018). In 2019, once again four WVU undergraduates were made offers – three for SURF in Gaithersburg, MD and one for SURF in Boulder, CO. In fact, 2019 was the second SURF experience for Katrina Rupert as she also participated in 2018. What a great way to represent WVU and the accomplishments of its undergraduate researchers in a national lab setting!



WVU's 2019 NIST SURF participants (left to right): Daniel Baker, Katrina Rupert, Oriana Ovide, and Chad Hite.

WVU's 2019 NIST SURF participants and their research were:

Development of Electrolyte Database Bases on Thermodynamic Properties. **Daniel Baker – SURF Boulder** (Daniel is a Chemical Engineering major from Glen Dale, WV.)

Elucidating the Role of Hinge Mechanics on Impact Mitigation. **Chad Hite – SURF Gaithersburg** (Chad is a Mechanical and Aerospace Engineering double major from Harpers Ferry, WV.)

Assessment of Elemental Homogeneity in Modern Glass micro-XRF for forensics. **Oriana Ovide – SURF Gaithersburg** (Oriana is a Chemistry and Forensics & Investigative Science double major at WVU from Greenbelt, MD.

Getting the Kinks Out: Reducing Disulfide Bonds for Protein Analysis. **Katrina Rupert – SURF Gaithersburg** (Katrina majored in Forensics & Investigative Science, graduated with her bachelor's degree in May 2019, and is now enrolled as a WVU graduate student for her master's in Forensics. Her hometown is Stafford, VA.)

RESEARCH APPRENTICESHIP PROGRAM – BEYOND SUMMER

The Research Apprenticeship Program (RAP) is a course-based undergraduate research experience that allows students to serve as apprentices for faculty members conducting research at WVU. RAP was established in fall 2017 and is designed for students with little to no research experience. The goal of the program is to help students advance career outcomes, explore academic passions, and gain access to the real-world application of their studies. RAP also expands scholarly opportunities for undergraduate students, facilitates their introduction to the concept of scholarship in their field, and improves their persistence within the major and at WVU. Students within the program conduct research across a broad spectrum of academic fields, including but not limited to research in STEM disciplines, arts, humanities, social science, and clinical research. Undergraduate students in the program may earn course credit or may use Federal Work-Study (FWS) funds to be paid for work in their research spaces.



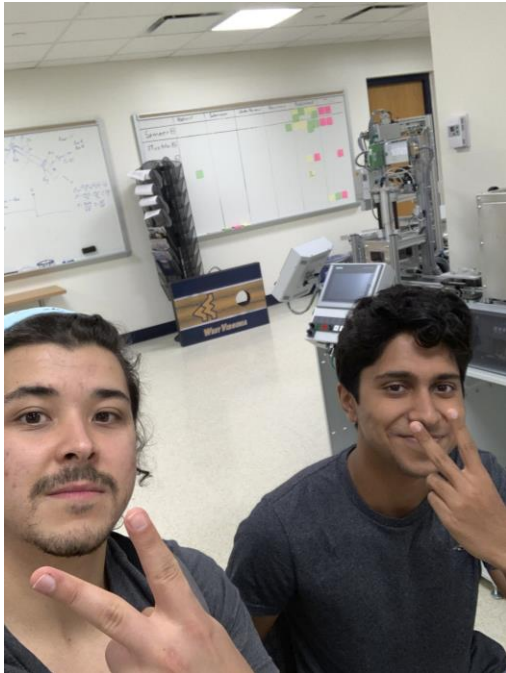
RAP student Kevin Bruce visits peer Peyton Caylor's research space as part of their RAP-Part I curriculum (left), while RAP student Amaya Jernigan visits peer Skylar Clemons' research space (right).

Building on the growth of student participation in previous semesters, in spring 2019 there were 55 new students that began RAP-Part I (first semester, introductory experience), while 112 continued from the previous semester into RAP-Part II (second semester, leveraging curriculum). In fall 2019, 138 new students began RAP-Part I, while 40 others continued from the previous semester to RAP-Part II. The RAP program expects continuation in this growth into the spring 2020 semester (see Table 3).

Table 3. Number of students engaged in research via the Research Apprenticeship Program (RAP) from the pilot year (Fall 2017) and projected (*) into the Spring 2020 semester.

RAP Course	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020*
RAP-Part I	52	33	146	55	138	65*
RAP-Part II		43	18	112	40	119*
RAP Graduates			22	26	38	52*
Totals	52	76	186	193	216	236

“RAP Graduates” represents the number of students continuing research after RAP by using FWS funding supervised by the RAP program. Though many other RAP graduates continue research via course credit, volunteering, or through funding provided by their mentors, these students are tracked in other ways (see the University-Wide Outcomes section). Currently, there are a total of 7 students who are continuing to conduct RAP research via work-study funding a full two years after their graduation from the program, and this number is expected to increase to 11 in spring 2020.



Research and programmatic evaluation of the RAP program are currently being conducted. Dr. Natalie Shook (Psychology) and Dr. Paul Hernandez (Educational Psychology) are researching the academic performance and persistence of FWS funded RAP participants compared to a control group of students who did not participate in the RAP program. Their preliminary findings suggest that participation in RAP has the most positive impact on first-year, first-generation students. In the ongoing study, the first-year, first-generation RAP participants have both higher collegiate GPAs and higher persistence rates that are statistically significant compared to the first-year, first-generation students in the control group. In addition, Dr. Kimberly Quedado (former Director of the RAP Program) began RAP program evaluation that surveys current RAP-Part I and II students several times throughout the semester on curriculum and the development of their researcher identities. Finally, Carinna Ferguson (RAP graduate teaching assistant and current MA student in Educational Psychology) is conducting her master's thesis research on the RAP program's influence on arts and humanities students.



RAP student Jakob Loverde visits peer Murad Hamirani's research space as part of their RAP-Part I curriculum (top), while RAP student Karah Alberts visits peer Tanisha Adams' research space (bottom).

The RAP program's success would not be possible without our graduate teaching assistants (GTAs) who teach the coordinating RAP classes and provide near peer mentoring for all RAP participants. We are thankful for our 2018–2019 graduate teaching assistants - Sloane Glover (Educational Psychology), Carinna Ferguson (Educational Psychology), Jenna Wilson (Psychology), and Nathan Altman (Counseling) – and our four 2019–2020 graduate teaching assistants, Carinna Ferguson (Educational Psychology), Madison Brooks (Counseling), Stephanie Augustine (Wildlife and Fisheries), and Alex Davidson (Accountancy). Additionally, in fall 2019 the RAP program piloted use of an advanced undergraduate as teaching assistant for the RAP course. UGR Ambassador and RAP graduate, Kayla Tokar (Music), was assigned as an undergraduate teaching assistant for one section of the RAP-Part I class in exchange for HONR 490 course credit. Kayla has gone above and beyond as a RAP teaching assistant and plans to continue in this role in the spring 2020 semester, where she will be joined by a second UGR Ambassador and RAP graduate, Kaley Vestal (English), who will act as our second pilot undergraduate teaching assistant.

The RAP program would not exist without the support of WVU's generous faculty members who help our undergraduate researchers pursue their passions.

FUNDING FOR UNDERGRADUATE RESEARCH

The Office of Undergraduate Research is actively pursuing funding to support undergraduate research and creative endeavors. For instance, UGR wrote its third iteration of a proposal to the Arnold and Mabel Beckman Foundation to fund a Beckman Scholars Program based at WVU. If selected for funding, the Foundation would provide a total of \$156,000 (for student stipends, scientific supplies/travel and mentor stipends) to fund six (6) high-achieving students with the potential to excel in research in the areas of biology, biochemistry, chemistry, and medical sciences as well as interdisciplinary combinations of these fields. Though UGR's 2018 proposal was not funded, it was one of 24 finalists nationwide that were considered for final review. The proposal was re-submitted in June 2019 for the 2020 competition. We heard in late September that our submission has "successfully completed phase one of the 2020 Beckman Scholars Program selection procedure" and "is now one of 26 finalists that will be considered for final review."

In October 2019, UGR wrote and submitted a renewal proposal for continued funding of the WVU SURE site for 2020-2022. Institutional commitments totaling \$167,000 were obtained from the WVU Colleges of Business & Economics, Creative Arts, and Education and Human Services; Davis College; Eberly College; Statler College; Health Sciences Center; the Departments of Biology and Chemistry; Research Corporation; and the Provost's Office. Along with the \$75,000 per year requested from the WV Higher Education Policy Commission's Division of Science and Research, the proposal would bring in \$242,000 per summer for three years in support of undergraduate research for 50 SURE participants.

In late November, UGR wrote and submitted a letter of intent to be considered as a site for hosting a 2-week residential immersive early research experience for first-generation students who are rising freshmen and intent on earning a STEM degree. It is expected that WVU and UGR will be invited to write and submit a full proposal (due Jan. 2). If successful, the First2 Network would provide funding for room and board, lab supplies, and participant stipends for 10-20 rising freshmen in summer 2020. Also provided would be (i) advanced undergraduate student mentors to assist with planning and on-site peer mentoring and (ii) limited faculty stipends. The 2020 Site would build from lessons learned during UGR's pilot immersive site that was run in summer 2019 with 9 rising freshmen as participants.



Emily Duckworth engaging in chemistry education research during the pilot First2 Summer Immersive program in July 2019 at WVU.

UGR regularly supports faculty members who include funding for undergraduate researchers in their proposals. UGR provides typical funding levels for undergraduate researchers or sites and a list of UGR offered summer and academic year activities that support undergraduates in research. UGR offers advice on administering undergraduate research sites or a few undergraduates in research. Offerings include template letters and contracts, mentoring handouts, advice stipend pay set-up, and contacts for housing, Mountaineer cards and supplemental insurance. We have provided support to:

- Yu Gu and Jason Gross (Mechanical and Aerospace Engineering and Robotics REU Site),
- Jessica Allen (Chemical and Biomedical Engineering),
- Ed Sabolsky and Kostas Sierros (Mechanical and Aerospace Eng. and Nano REU proposal submission),
- Jonathan Boyd (Orthopaedics),
- Kimberly Quedado (Emergency Medicine),
- Brian Popp (Chemistry), Mark Tseytlin (Biochemistry),
- Brenden McNeil (Geography), Natalie Shook (Psychology),
- Shawn Grushecky (Energy Land Management),
- Duncan Lorimer (Physics and Eberly College), and
- Cerasela Zoica Dinu (Chemical and Biomedical Engineering).

PRESENTATIONS AND AWARDS - BEYOND WVU

UGR staff routinely attend Council on Undergraduate Research (CUR) conferences to advertise WVU's successes and programming models and to improve UGR's knowledge of nationwide trends in undergraduate research programming and funding mechanisms. In the past year, UGR staff presented their research in poster and oral forms and took part in a panel discussion on use of FWS funding to support undergraduates in research as outlined below. (Bold = main presenter)

Poster Presentations

Richards-Babb, M. "Establishing an Institutional Office of Undergraduate Research for Broadened Participation" 2019 CUR Undergraduate Research Programs Conference, Columbus, OH, July 2019.

Walden, K.; Richards-Babb, M. "Recruitment and Sustainability Plans for Starting a Student-Directed Undergraduate Research Journal" 2019 CUR Undergraduate Research Programs Conference, Columbus, OH, July 2019.

Richards-Babb, M. "Perceived Confidence in Research Skills and Immersive Summer Research, Do Demographic Differences Exist?" 2019 Gordon Conference on Chemical Education Research and Practice, Lewiston, ME, June 2019.

Panel Presentations

Quedado, K. "Multiple Approaches: Using Financial Aid Awards to Support and/or Sustain Undergraduate Research" 2019 CUR Undergraduate Research Programs Conference, Columbus, OH, July 2019.

Oral Presentations

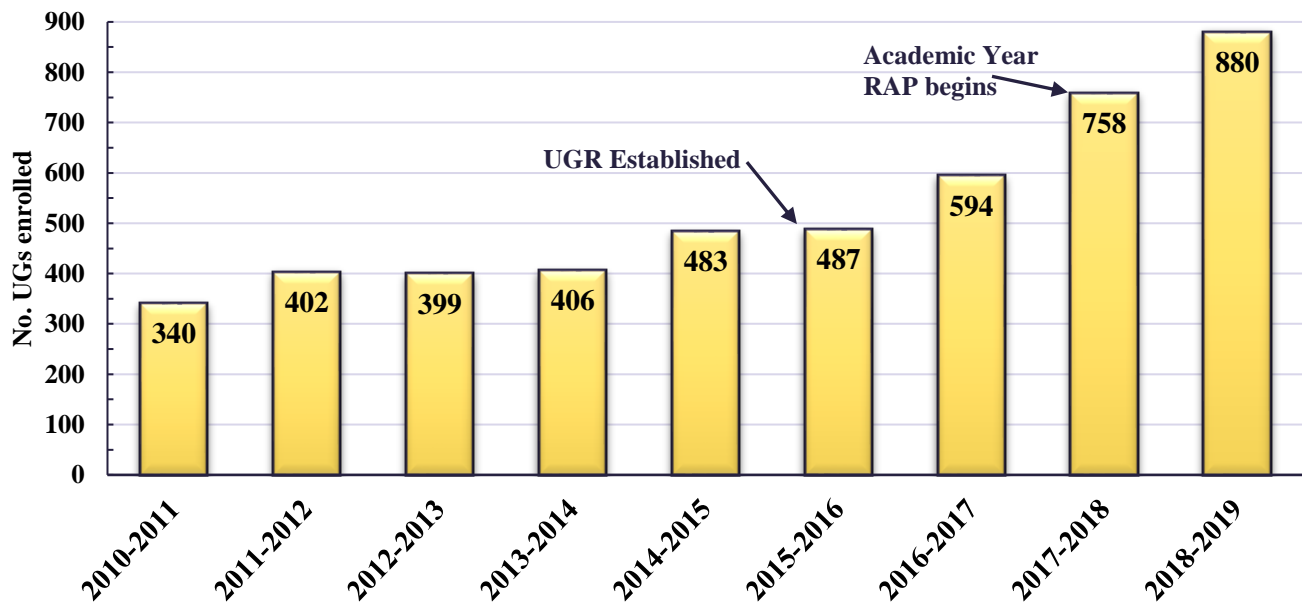
Richards-Babb, M.; **Quedado, K.** "Leveraging Federal Work Study Funds to provide Research Opportunities: West Virginia University's Research Apprenticeship Program (RAP), First2 Network Biennial Conference, Charleston, WV, Dec. 2018.

In spring 2019, the WVU Provost's Office nominated UGR for the CUR *Campus-Wide Award for Undergraduate Research Accomplishments (AURA)*. This award "recognizes higher education institutions that have successfully implemented some or all of CUR's Characteristics of Excellence in Undergraduate Research, have devised exemplary programs to provide high-quality research experiences to undergraduates and have evaluated the success of these programs."

WVU was identified as a finalist for the fifth annual CUR AURA and submitted a full portfolio in support of its application in July 2019. Though WVU was considered "one of 12 outstanding finalists selected from a pool of many exemplary institutions", WVU was not selected as a 2019 AURA recipient. However, we were gratified to be considered for this award especially as WVU's centralized Office of Undergraduate Research has been in existence for less than 5 years.

INSTITUTION-WIDE OUTCOMES

The Office of Undergraduate Research is engaged in institution-wide tracking of undergraduate research activities. The number of undergraduates involved in scholarly activities as measured by student enrollment in research coursework at WVU has increased dramatically since 2010-2011. Factors that have contributed to this increase are (i) establishment (in 2015) of the centralized Office of Undergraduate Research, (ii) development of academic year research offerings (e.g., RAP), (iii) expansion of summer research offerings (e.g., SURE), and (iv) targeted advertisement of UGR programming and the benefits of doing research to incoming students (at New Student Orientation) and to faculty and staff members.



To spread the word about undergraduate research, UGR continues to visit faculty during departmental meetings. Thus far, UGR has visited the departments or has upcoming visits with the departments listed below.

Completed Visits

- Biology
- Physics
- Anatomy Division
- Mechanical and Aerospace Engineering
- Pharmaceutical Systems and Policy
- Design and Community Development
- Finance
- Sociology
- Coaching and Teaching Studies
- Pharmacy
- History
- Public Health
- Forestry and Natural Resources
- Psychology
- Geology and Geography
- Chemistry
- Libraries
- Theatre and Dance
- CLASS
- Physiology and Pharmacology
- Music

Upcoming Visits

- Mathematics
- Economics
- Management
- Women's and Gender Studies
- Forestry and Natural Resources
- Social Work
- Obstetrics and Gynecology
- Orthopaedics

UNDERGRADUATE RESEARCH AMBASSADORS – BEYOND UGR



Fall 2019 UGR Ambassadors (left to right): Brittany Smith, Janna Kleinsasser, Annalisa Huckaby, Quinn Hopen, Oriana Ovide, Colter Uscola, Mya Vannoy, Trinity Shaver, and Kaley Vestal. (Photo Credit: Kayla Tokar, an additional UGR ambassador).



From left to right: Kevin Walden, Kaley Vestal, and Janna Kleinsasser discussing research opportunities with prospective students at WVU Discover Days. Photo Credit: University Relations.

The Undergraduate Research Office Ambassador (UGRAs) program was established in fall 2018 and entered its second year in fall 2019. Students serving in the ambassador program are nominated and accepted into the program based on their outstanding performance as students, commitment to research, and eagerness to discuss research opportunities with their peers. Ambassadors play key roles in undergraduate recruitment and outreach due to their ability to provide testimonies on the impact research has had on their personal trajectories and their capacity to speak with near peers about getting started in or advancing their research. Ambassadors serve the office through a variety of roles, including RAP class visits, tabling for event and program recruitment, blogging, serving as research panelists, writing thank you cards, and promoting social media.




Ambassadors represent a wide range of disciplines, including music (Kayla Tokar, senior), English (Kayley Vestal, junior), immunology and medical microbiology (Mya Vannoy, senior, and Quinn Hopen, junior), chemistry and biology (Janna Kleinsasser, junior, and Annalisa Huckaby, senior), forensics and investigative sciences (Oriana Ovide, senior), sociology (Colter Uscola, senior), psychology (Trinity Shaver, senior), and public health (Brittany Smith, senior).

SOCIAL MEDIA OUTREACH

Since fall 2018, the Office of Undergraduate Research has expanded its marketing through social media and a newly established monthly newsletter, UGR Monthly, to communicate more extensively with students and faculty members about research programming, opportunities, and upcoming deadlines.

Results from office surveys in fall 2018 indicated that students have a strong preference for learning about research announcements and events through platforms like Twitter or Instagram. Since the office has established social media accounts for Facebook, Twitter, and Instagram, they have continued to show steady growth. The number of followers for Facebook has grown 72%, Twitter has grown 53%, and Instagram has grown by 70%.

UGR Monthly was started in fall 2019 with the help of Kayla Tokar, editor. Each month, a newsletter designed in Mailchimp, a marketing automation platform, is sent out to a list of student and faculty subscribers to announce upcoming deadlines and opportunities for undergraduate researchers.

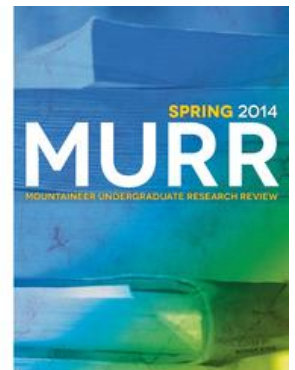
	Facebook 	Twitter 	Instagram 
Spring 2018	1 post, 6 likes and followers	22 tweets, 34 followers	NA
Fall 2018	41 posts, 65 likes, 69 followers	105 tweets, 127 followers	33 posts, 218 followers
Fall 2019	High office activity, 105 likes, 119 followers	High office activity, 194 followers	57 posts, 372 followers
Increase in followers from Fall 2018-Fall 2019	72% increase	53% increase	70% increase

MOUNTAINEER UNDERGRADUATE RESEARCH REVIEW (MURR)

In fall 2019, two students, Jeffrey Petty (biochemistry) and Zachary Gilpin (history, Latin American studies), elected to apply to the Honors Experiential and Community Engaged Learning (EXCEL) Program and chose the relaunch of the lapsed WVU undergraduate research journal, the Mountaineer Undergraduate Research Review (MURR), as their proposed project.

From 2009-2014, MURR was WVU's student-led undergraduate research journal, initially launched by junior biology and environmental geoscience honors student, Molly Simis. MURR advances opportunities for WVU students by providing an outlet for publishing scholarly and creative works while deepening their engagement within their field of study. By contributing to MURR, students play an active and critical role in solidifying WVU's reputation as a very high research-intensive, land grant university.

With the establishment of the Office of Undergraduate Research and interested students from the Honors EXCEL Program, initiatives for releasing MURR Volume 5 are underway with an expected publication date for Fall 2020.



MURR Vol. 4 was last published in Spring 2014. The MURR Vol. 5 release is scheduled for fall 2020.

VISION AND MISSION

Vision: West Virginia University's Office of Undergraduate Research envisions its program as one that will contribute to world-changing discovery and innovation, academic engagement, and excellence through its focus on scholarly inquiry that prepares students to create the ideas and opportunities that shape and advance our state, nation, and world.

Mission: The Mission of the Office of Undergraduate Research at West Virginia University is to enhance academic excellence through undergraduate research and creative endeavors. We connect undergraduate students, who have strong and committed interests in research and creative endeavors, to faculty members, programs, and research-related opportunities that are aligned with their interests. As the home of the *WVU Summer Undergraduate Research Experience (SURE)* program, we foster a culture of academic engagement by providing unparalleled opportunities for student participation in research. We work to institutionalize undergraduate research and creative endeavors as a key component of the educational experience across all disciplines at West Virginia University.

For undergraduate students, the Office of Undergraduate Research:

- offers on-campus programming including symposia and summer undergraduate research opportunities;
- connects students with on-campus research opportunities;
- connects students with off-campus/external research opportunities;
- offers advice on applying for and enhancing applications to undergraduate research opportunities (on-campus and off-campus);
- offers advice on finding travel funding and preparing research for presentation;
- connects students with opportunities to present their scholarly work; and
- connects student researchers with faculty research mentors.

For faculty, the Office of Undergraduate Research:

- connects faculty members with student researchers;
- aids faculty members in supporting undergraduate research activities;
- provides budgetary templates and language for inclusion of undergraduate researchers in proposals;
- aids faculty in writing proposals to support undergraduate research sites;
- offers on-campus programming for undergraduate researchers; and
- acts as a resource for undergraduate scholarly investigations across WVU.

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